General Technologies Corp.

CT8027

Professional Automotive Digital Multimeter

1. SAFETY RULES

- This meter is designed for indoor use at temperatures between 0°C to 40°C and altitudes up to 2,000m.
- To ensure that the meter is used safely, follow all safety and operating instructions in this operation manual. If the meter is not used as described in this operation manual, the safety features of this meter might be impaired.
- Do not use the meter if the meter or test leads look damaged ,or if you suspect that the meter is not operating properly.
- When using the instrument, keep your fingers behind the finger guards on the plastic casing and probes.
- Disconnect the live test lead before disconnecting the common test lead.
- Make sure power is off before cutting, desoldering, or breaking the circuit wires. Small amounts of current can be dangerous.
- Do not apply more than 600 VDC or 600V AC rms between a terminal and ground.
- To avoid electrical shock, use CAUTION when working above 60V DC or 25V AC rms. Such voltages pose a shock hazard.
- Never make measurements with the battery cover off.
- To avoid electrical shock or damage to the meter, do not exceed the input limits.

2. INTERNATIONAL SYMBOLS

⚠ Important information see manual	⚠ Dangerous Voltages
~ AC	Continuity
⎓ DC	⏚ Ground
	⧈ Double Insulation

3. TECHNICAL SPECIFICATIONS

3.1 General Specifications

Display:	4 digits LCD, max. of 9999 display
Polarity:	Automatic, (-) negative polarity indication
Zero adjustment:	Automatic
Sample rate:	0.25 Sec., 0.05 Sec. for bar graph
Over range indication:	"OL" is displayed
Power:	9-volt battery type NEDA 1604, IEC6F22
Battery life:	Approx. 70 hours. (w/ alkaline batteries)
Dimension:	5.9"x2.95"x1.34" or 150x75x34 mm.
Weight:	Approx. 8.9 Oz. or 252g (with battery).
Accesories:	User's Manual, Test Leads, Protective Holster, Hard carriying case, K-type temperature probe, Inductive pick-up and 9V battery.

3.2 Electrical Specifications

- Accuracies are ±(% of reading + number of least significant digits) at 23°C ±5°C, less than 75% RH. For DC/AC current measurement, the maximum current of 10 A is for 30 Sec. with 5 min. cool down between measurements.

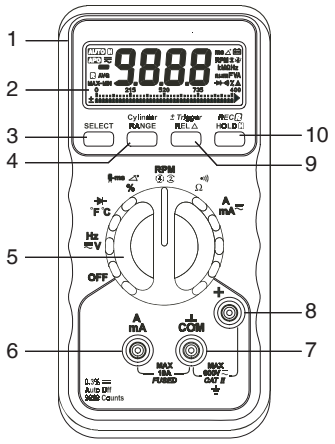
Function	Range	Accuracy	Input Impedance	Remarks	Overload Protection
DC Voltage	999.9 mV, 9.999 V, 99,99V	0.3%+3	10 MΩ, 16MΩ for 999.9 mV range	-	600 Vrms
	600 V	0.3%+5			
AC Voltage	999.9 mV	2.5%+5	10 MΩ, 16MΩ for 999.9 mV range	50~200Hz	600 Vrms
	9.999 mV, 99.99 V	2.5%+5		50~500Hz	
DC Current	4000 mA	1.2%+6	0.03V/A Burden Voltage	-	10 A - 250V Fast Acting Fuse
	10.00 A	0.8%+4			
AC Current	4000 mA	2.5%+10	0.03V/A Burden Voltage	-	10 A - 250V Fast Acting Fuse
	10.00 A	1.2%+3			

Function	Range	Accuracy	Input Impedance	Remarks	Overload Protection
Resistance	999.9Ω	0.5%+6	-	1.3 V Max. Test Voltage (2.7 V in 999.9Ω range)	600 Vrms
	9.999 kΩ, 99.99 kΩ	0.5%+2			
	999.9 kΩ, 4.000 MΩ	0.8%+2			
	40.00 MΩ	1.5%+5			
Diode Test	9.999 V	-	< 3.5 V Test Voltage		600 Vrms
Frequency	999.9Hz to 20.0 kHz	0.01%+2	1, 2, 20 and 200 Vrms Selectable threshold		600 Vrms
Fuel Injector	0.05 - 250 mS	0.05mS+1		Selectable +/- Slope, and Number of Cylinders	600 Vrms
	0.0 - 100 %	0.04%/krpm +2			
	0.05 - 250 mS	0.05mS+1			
	0.0 - 100 %	0.04%/krpm/cyl +2			
Tachometer	120-20000 RPM	2 RPM		RPM 4	600 Vrms
	60-10000 RPM			RPM 2	
	30-5000 RPM			RPM 2M	
Dwell	0.0º - 360.0º	1.2º/krpm+1		1 to 12 Cyl.	600 Vrms
	0.0º - 100.0º	0.04º/krpm/cyl +2			
Temperature	-20º to 300ºC	3ºC+1	K-Type Thermocouple Probe		600 Vrms
	301º to 500ºC	2%+1			
	0º to 572ºF	6ºF+2			
	573º to 932ºF	2%+2			

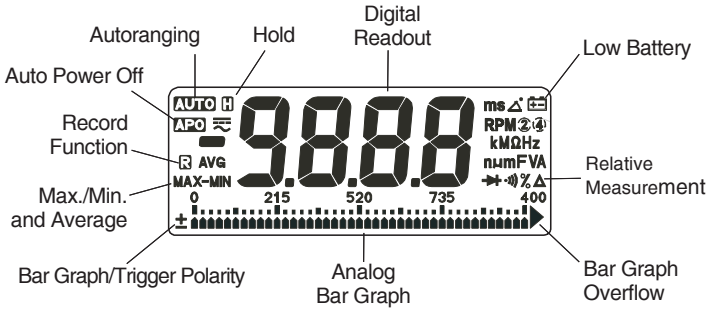
4. OPERATION

4.1 Instrument Description

1) Case
2) 4 Digit LCD display
3) Secondary Functions Button
4) Auto/Manual Select
5) Function Switch
6) Current Measurment Input
7) Common Input
8) Measurements Input
9) Trigger and Rel. Button
10) Hold and Max/Min. Button



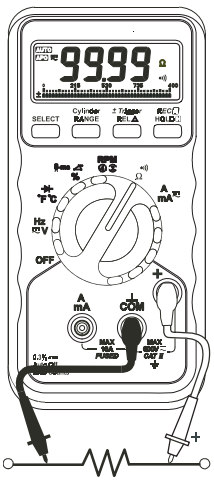
4.2 Display Description



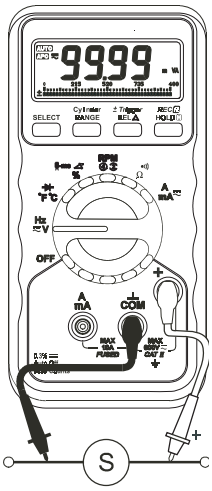
4.3 Measurement Procedures

⚠ **CAUTION**: Maximum Input Voltage is 600Vrms,do not exceed this rating to avoid personal injuries or damage to the instrument. The FUNCTION switch should be set to the range you want to test before the operation.

⚠ **CAUTION**: Always ensure that the correct terminals are used for the type of measurement to be made. Avoid making connections to "live" circuits whenever possible.When making current measurements ensure that the circuit is not "live" before opening it in order to connect the test leads.



Measuring resistance and continuity



Measuring Voltages

4.3.1 DC/AC Voltage measurement

- Connect the black test lead to the "**COM**" socket and red test lead to the "**+**" socket.
- Set the **FUNCTION** switch to the "⎓ **V Hz**" function.
- The instrument default to DC measurement. To measure AC Voltages press the **SELECT** button momentarily.
- Connect the read probe into the "**+**" input and the black probe into the "**COM**" input.
- Connect the test leads across the source or load under measurement. Readout will show on the LCD display.

4.3.2 DC Current measurement

- Connect the black test lead to the "**COM**" socket and red test lead to the "**A mA**" input connector. .
- Set the **FUNCTION** switch to the "**mA A** ⎓" function.
- Connect the test leads in series with the source or load under measurement.
- The instrument default to DC measurement. To measure AC Current press the **SELECT** button momentarily.
- Connect the test leads in series with the source or load under measurement. Readout will show on the LCD display.

4.3.3 Resistance measurement and Continuity Test

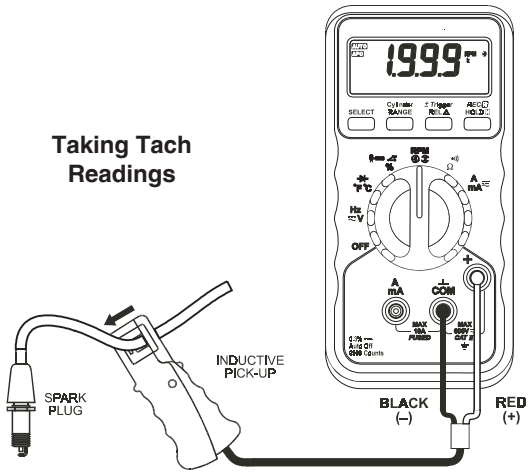
⚠ **CAUTION**: Maximum Input Voltage for this function is 600 Vrms do not exceed this rating to avoid personal injuries or damage to the instrument. Also ensure there is no power applied to the component or circuit and all capacitors are discharged.

- Connect the black test lead to the "**COM**" socket and red test lead to the "**+**" socket.
- Set the **FUNCTION** switch to the "Ω•))" position. The instrument will default to Resistance measurement, to select the Continuity Test function press the "**SELECT**" button momentarily.
- Connect the test leads across the componet or circuit under measurement.
- The measurement will be shown in the LCD Display when the probe are connected. For Continuity Test a continuous beeping sound indicates that the measured resistance is < 100 Ω.

4.3.4 Frequency measurement

- Connect the black test lead to the "**COM**" socket and red test lead to the "**+**" socket.
- Set the **FUNCTION** switch to the "⎓ **V Hz**" function.
- The instrument default to VDC measurement. To measure frequency press the **SELECT** button momentarily twice, and the Hz will appear on the display.
- Connect the read probe into the "**+**" input and the black probe into the "**COM**" input.
- When the frequency function is selected, the trigger level defaults to 1 Volt. If the readings are unstable or if there is not reading at all, it maybe be necesary to change the trigger level. To change the trigger level, press the "**RANGE**" button once to display the selected level, and then press the "RANGE" button within 1 second. Every time the button is pressed the trigger level will change to the next value (1V, 2V, 20V and 200V).
- Connect the test leads across the source or circuit under measurement. Readout will show on the LCD display.

4.3.5 Tach (RPM) Measurement

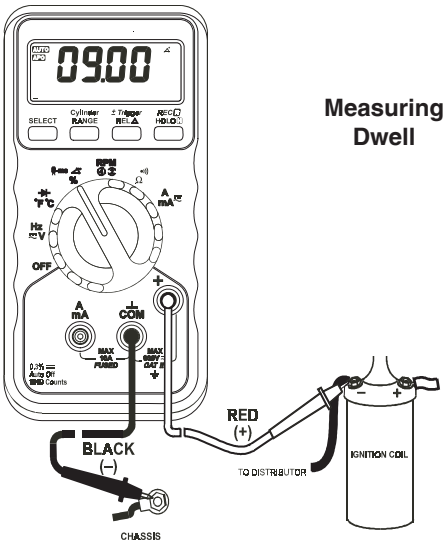


Taking Tach Readings

- Connect the black lead plug of the inductive pick-up into the "**COM**" socket and red lead plug to the "**+**" socket.
- Set the **FUNCTION** switch to the **RPM** position.
- Press the SELECT button to select through "**RPM** ④" for 4 strockes, "**RPM** ②" for 2 strockes and DIS, and "**RPM** ② **M**" for 2 strockes with waste spark ignition system engines.
- Open the Inductive Pick-up clamp and insert a spark plug wire inside, observing that the arrow on the Inductive Pick-up points to the spark plug, and then close the clamp making sure that the clamp jaws are completely close. The RPM will be shown in the LCD Display when the engine is running.

4.3.6 Dwell Angle Measurement

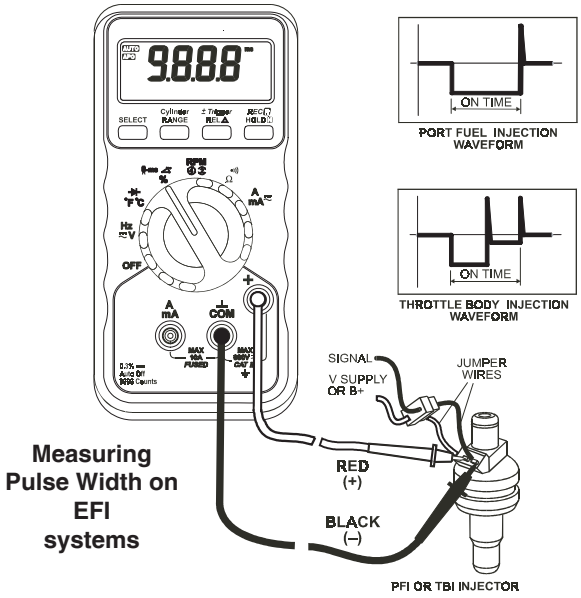
- Connect the black test lead to the "**COM**" socket and red test lead to the "**+**" socket.
- Set the **FUNCTION** switch to the "**ms** **%**" position, and press the **SELECT** button once to select the Dwell function.
- The Number of cylinders defaults to 4 (Ч-□)**.** Press the "**Cylinder /RANGE**" switch to display the cylinders setting, and immediately press the button again to select the number of cylinders (1 through 12) of the engine under test.



Measuring Dwell

- Connect the black test lead to the vehicle ground or negative (-) terminal of the battery, and the red test lead to the breaker point of the distributor or negative (-) terminal of the ignition coil.
- To display Dwell as a percentage (**%**), press the "**SELECT**" button once. To display reading in degrees again, press the "**SELECT**" button twice.
- To change the trigger level and slope please refer to Section 4.4.4 and 4.4.5 of this manual.

4.3.7 Fuel Injector (Pulse Width) Measurement

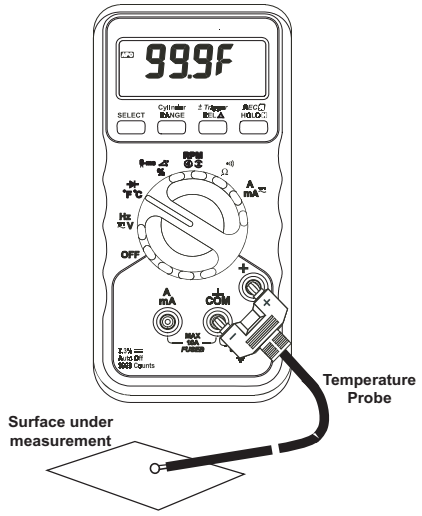


Measuring Pulse Width on EFI systems

- Connect the black test lead to the "**COM**" socket and red test lead to the "**+**" socket.
- Set the **FUNCTION** switch to the "**ms % **" position, the instrument default to **ms** , with units in ms (milliseconds).
- Connect the black test lead to the signal wire terminal of the fuel injector, and the red test lead to the positive supply wire terminal of the fuel injector.
- To display pulse width as a percentage (**%**) or duty cycle, press the "**SELECT"** button twice. To display reading in '**ms**' units again, press the "**SELECT**" button again.
- This function applies to both Port Fuel Injectors (PFI) and Throttle Body Injectors TBI). To change the trigger level and slope please refer to Section 4.4.4 and 4.4.5 of this manual.

4.3.8 Temperature Measurement

- Set the **FUNCTION** switch to the "**°F °C**" position.
- The instrument defaults to **ºC** units, to select **ºF** units press the "**SELECT**" button once. To return to **ºC** units press the "**SELECT**" button twice.
- Connect the K-type thermocouple probe connector into the "**COM**" and "**+**" sockets observing the polarity of the connector and socket.
- Make contact between the thermocouple at the end of the probe the object to measure. To obtain accurate temperature measurements, the contact between the probe and the object to measure should be maintained for a few seconds until the readout on the display becomes stable.



Measuring Temperature

4.4 Other Functions

4.4.1 Diode Test

⚠ **CAUTION**: Maximum Input Voltage for this function is 600 Vrms, do not exceed this rating to avoid personal injuries or damage to the instrument.

- Connect the black test lead to the "**COM**" socket and red test lead to the "**+**" socket.
- Set the **FUNCTION** switch to the "**°F °C**" position. The instrument will default to temperature measurement in **ºC** units, to select (diode test) press the "**SELECT"** button twice.
- **Forward voltage drop test:** Connect the test leads across the diode observing the polarity: red probe to the anode (+) of the diode and black test lead to the cathode (-) of the diode under test. The readout of a good silicon diode should be between 0.4 to 0.9 V. A readind outside this range may indicate a defective diode.
- **Reverse Voltage test:** Connect the test leads across the diode observing the polarity: red probe to the Catode (-) of the diode and black test lead to the anode (+) of the diode under test. A diode in good condition should produce a "OL" reading, other reading may indicate a damaged or defective diode.

4.4.2 Manual and Autoranging Operation

- To lock the present range, press the "**RANGE**" button once, and the AUTO display indicator will turn off. Pressing the "**RANGE**" button will step through the ranges. Pressing and holding the "RANGE" button for 1 second or more will restore the meter to autorange mode.
- **NOTE:** When the instrument is in Record, Hold or Relative mode, pressing the "**RANGE**" button will cause the meter to exit these operations.

4.4.3 Relative measurements

- Pressing the "**REL Δ**" button once enter the relative measurement mode. In this mode the instrument offsets all the following measurements with the value present at the time the relative mode was entered.
- The relative mode can be used conmbined with any other function, including MAX, MIN, MAX-MIN and AVG readings of the RECORD function.
- Pressing the "**REL Δ**" button again exits this function.

4.4.4 Trigger Level selection

- When measuring Frequency, Dwell or Pulse Width, and the readings are unstable or if there is not reading at all, it maybe be necesary to change the trigger level.
- To change the trigger level, press the "**RANGE**" button once to display the selected level, and then press the "**RANGE**" button within 1 second. Every time the button is pressed the trigger level will change to the next value (1V, 2V, 20V and 200V).

4.4.5 Trigger Slope selection

- The slope function is useful when performing **Dwell** and **Pulse Width** (**Fuel Injector**) measurements. For example, if you are measuring a signal with 10% duty cycle when the trigger is set to **+**, the same waveform will show a duty cycle of 90% when the trigger is set to **–.**
- To Toggle between **Trigger +** and **–,** press and hold the **+ Trigger** (**REL Δ)** for 1 second or more.

4.4.6 Hold Display Data

- Pressing the "**HOLD**" button, will toggle the hold display funcion on and off.
- When the **HOLD** function is activated, the readout on the display will be maintained or 'freezed' until the function is turned off by pressing the "**HOLD**" button again.

4.4.7 Record Mode

- Pressing the "**REC R**" button for 1 second or more will activate the **RECORD** mode, and the R AVG MAX-MIN indicator will appear in the display.
- When the **RECORD** function is activated, the instrument will beep when a new maximum or minimum is detected.
- To read the MAX, MIN, MAX-MIN and AVG, press the **REC R** button to step through the recorded measurements.
- Pressing the "**REC R**" button again for 1 second or more will exit the **RECORD** mode.

4.4.8 Auto Power Off

- This function is included to extend the battery life when the instrument is not in use.
- The instrument will turn **OFF** automatically and sound a warning beep, after approxiamtely 4 minutes of no activity (i.e. rotary switch or buttons operations, or no significant meter reading changes), .
- The instrument is turned automatically **ON** if the **FUNCTION** switch is operated.

4.4.9 External power lines noise filtering

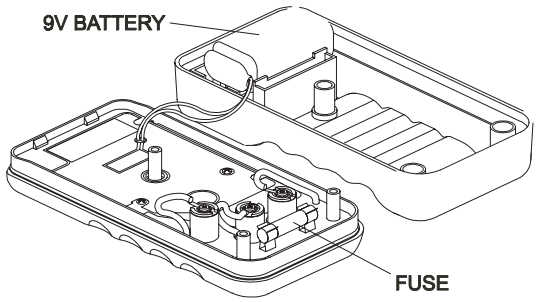
- When the **RECORD** function is activated, the instrument will turn off the AUTO POWER OFF function, and the APO indicator in the display will not show.
- To read the MAX, MIN, MAX-MIN and AVG, press the **REC R** button to step through the recorded measurements.
- Pressing the "**REC R**" button again for 1 second or more will exit the **RECORD** mode.

5. MAINTENANCE

⚠ **CAUTION:** Before attempting battery removal or replacement, disconnect test leads and remove the instrument from any energized circuit to avoid shock hazard.

5.1 Battery Replacement

- To replace the battery, remove the 3 screws of the back cover (back of the case), and lift the end of the case nearest to the input sockets, until it unsnaps from the case top. Remove the battery.
- Replace with a new 9 V alkaline battery type NEDA 1604 or IEC6F22 observing the proper polarity from the diagram on the label inside the battery compartment.
- Reinstall the case cover, ensuring that all gaskets are properly seated, and that the snaps on the case top (near the LCD Display) are engaged. Replace and tighten the securing screws.



5.2 Fuse replacement

- To replace the fuse, remove the 3 screws of the back cover (back of the case), and lift the end of the case nearest to the input sockets, until it unsnaps from the case top.
- Replace new fuse only with the identical type and rating.

  F2=10A: Type IEC60127-2 or UL248-14 (6.3x25.4mm) fast acting fuse, rated at 10A/250V.

- Reinstall the case cover, ensuring that all gaskets are properly seated, and that the snaps on the case top (near the LCD Display) are engaged. Replace and tighten the securing screws.

5.3 Cleaning And Storage

- Periodically wipe the case with a soft damp cloth and mild household cleanser. Do not use abrasives or solvents. Ensure that no water gets inside the instrument to prevent possible shorts and damage.
- If the instrument is not to be use for long periods of time (60 days or more) to avoid damage due to battery leakage, remove the battery from the instrument and store it separately.

6. WARRANTY

One year limited warranty, excluding batteries and fuses. For details see Standard Warranty Information in our webpage or request a printed copy.

General Technologies Corp.

#121 - 7350 72nd Street
Delta, BC
Canada V4G 1H9

Tel.: (604) 952-6699
Fax: (604) 952-6690
www.generaltechnologies.net

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